

# Frequency of Distant Metastasis of Differentiated Thyroid Carcinoma- A Descriptive Analysis

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## Abstract

**Introduction:** The presence of distant metastases is one of the important predictive factors of poor outcomes in patients with thyroid carcinoma. It is rarely observed at early presentation of differentiated thyroid carcinoma (DTC). This study aimed to analyze the frequency of distant metastasis in differentiated carcinoma of the thyroid. **Methods:** This cross-sectional observational study was conducted at the Department of Otolaryngology, Rajshahi Medical College Hospital, Rajshahi, and Department of Otolaryngology Bangabandhu Sheikh Mujib Medical University (BSMMU), from July 2011 to Jun 2012. A total of 40 patients were selected as study subjects by simple random sampling technique. A descriptive analysis of data was carried out by using a statistical package for social science (SPSS) 22.0 for Windows. **Result:** In this study, a majority (35, 87.5%) of the patients suffered from papillary carcinoma, followed by (5, 12.5%) follicular carcinoma. Considering the distant metastasis, 2 (5.71%) patients had metastasis to the lung among the patients with papillary carcinoma (n=35). 1 patient had lung metastasis and another 1 patient had bony metastasis among the follicular carcinoma patients. In terms of distant metastasis, 50% of the patients had distant metastasis from each papillary and follicular carcinoma. **Conclusion:** This study concludes that metastasis in differentiated thyroid carcinoma is not uncommon. Distant metastasis is more common in follicular thyroid carcinoma than papillary carcinoma. Lung and bone metastasis are common regarding the site of metastasis.

**Keywords:** Distant Metastasis, Papillary carcinoma, Follicular carcinoma, Thyroidectomy.

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## INTRODUCTION

Differentiated thyroid cancer (DTC), together with papillary thyroid carcinoma (PTC) and follicular thyroid carcinoma (FTC), is one of the most curable cancers and has a promising long-term prognosis [1]. Distant metastasis (DM) is rarely observed at the early presentation of differentiated thyroid carcinoma (DTC), making it hard to assess the clinical features and treatment outcomes of DTC patients with DM [2]. Malignant thyroid tumors can originate from any of the cellular components of the gland: Follicular and parafollicular cells, lymphoid cells, and stromal cells. The vast majority are the follicular cell neoplasms of which Papillary thyroid carcinoma (PTC) and Follicular thyroid carcinoma (FTC) are the commonest, collectively called Differentiated thyroid carcinoma

(DTC) [3]. FTC occurs more commonly in areas of endemic goiter than PTC [4]. Exposure to ionizing radiation, endemic goiter, prolonged TSH stimulation, and high iodine intake are important in the causation of thyroid malignancy [3,4]. The presence of a solitary thyroid nodule is also a risk factor for malignancy. The incidence of malignancy within a clinically apparent solitary thyroid nodule is approximately 10% [3]. The reported incidence of carcinoma in solitary nodules varies from 2-20%. [5,6] Lymph node metastasis carries an important prognostic value [7]. In DTC, distant metastasis was more common in follicular (12.5%) than papillary carcinoma (3.70%) [8]. DTC comprises approximately 90% of all thyroid cancers and carries an excellent long-term prognosis [9]. Recent studies have confirmed the incidence of nodal metastasis in PTC ranging from 60-65% [7, 10-12]. Lymph node

metastases in FTC occur less frequently but prefer to metastasize via veins to distant organs [13,10]. Metastasis in the central compartment is more common than in the ipsilateral and contralateral cervical lateral compartments [14]. Regarding the level of involvement, the most frequently involved levels are ii (52%), iii (57%) and iv (41%) [15]. There are several techniques to investigate thyroid carcinomas. About 80% of discrete swelling is “cold”. Most nonfunctional / or “cold” nodules are benign but as many as 20% may be malignant. The principal benefit of isotope scanning is to identify metastasis or residual local disease after total thyroidectomy for follicular carcinoma. Whole-body scanning can also be used to demonstrate metastasis but the patient must have no normal functioning thyroid tissue when the isotope is given because thyroid cancer can only very rarely compete with normal thyroid tissue in the uptake of iodine. Moreover, an ultrasound helps measure tumor size, diagnosing multinodular goiters and excluding contralateral disease. Ultrasonography can also be used to evaluate complex cysts and can distinguish purely cystic nodules [16,17]. This study aims to detect the frequency of distant metastasis in differentiated carcinoma of the thyroid.

## OBJECTIVE

### General Objective

- To detect the frequency of distant metastasis in differentiated carcinoma of the thyroid.

### Specific Objectives

- To know the age and sex distribution of the study subjects.
- To see the educational status and occupation of the respondents.
- To observe the distribution of type of malignancy.
- To assess the symptoms on admission to the hospital of differentiated thyroid carcinoma.

## METHODS

This cross-sectional observational study was conducted at the Department of Otolaryngology,

Rajshahi Medical College Hospital, Rajshahi, and Department of Otolaryngology Bangabandhu Sheikh Mujib Medical University (BSMMU), from July 2011 to June 2012. All the patients having carcinoma thyroid with or without metastasis were considered as the study population. A total of 40 patients were selected as study subjects by simple random sampling technique as per inclusion and exclusion criteria.

### Inclusion Criteria

- Patients with thyroid malignancy with or without metastasis.
- Both male and female patients.
- Patients who were willing to give consent.

### Exclusion Criteria

- Patients with thyroid disease, lymphoma, anaplastic and medullary carcinoma.
- Patients with associated co-morbidities like hypertension, diabetes, bronchial asthma.
- Patients who did not give consent to participate in the study.

Patients undergo a thorough clinical examination of the ear, nose, throat, and head neck, including general examination, and important investigation. The findings of the clinical examination and results of the investigation have been recorded and plotted on the datasheet. Some data were collected from the patients by face-to-face interview. All data were collected using a pre-formed questionnaire. Collected data were analyzed using descriptive statistics. A descriptive analysis of data was carried out by using a statistical package for social science (SPSS) 22.0 for Windows. After analysis, the data were presented in tables and charts. Ethical clearance was taken from the ethical committee of BSMMU. Informed written consent was obtained from the participants.

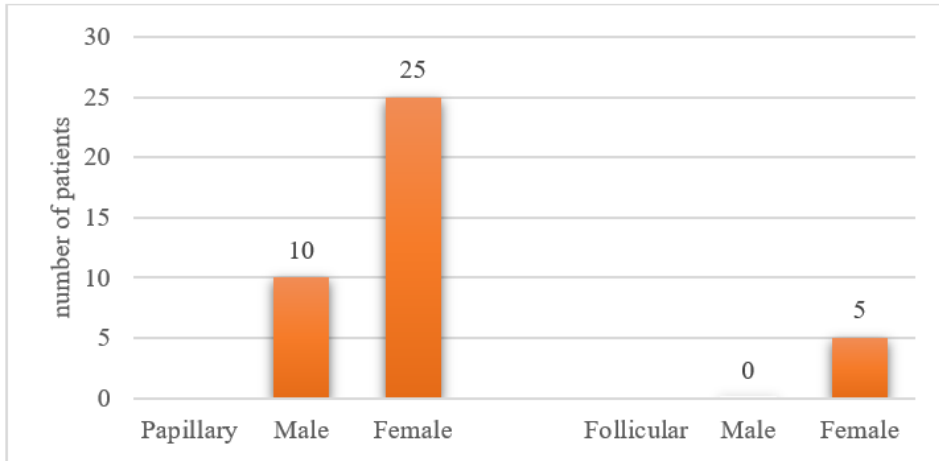
## RESULTS

**Table 1: Age distribution of differentiated carcinoma: (N=40)**

Age (years)	Papillary (35 patients)		Follicular (5 patients)	
	n	%	n	%
11-20	3	8.57%	0	0.0%
21-30	22	62.86%	0	0.0%
31-40	3	8.57%	1	20.0%
41-50	2	5.71%	2	40.0%
51-60	5	14.29%	1	20.0%
61-70	0	0.0%	1	20.0%

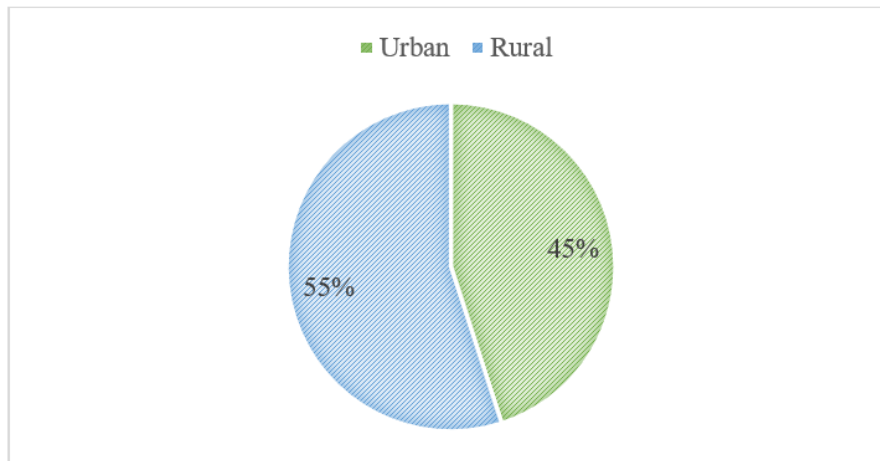
Among the papillary carcinoma highest (62.86%) number of cases were found in 3<sup>rd</sup> decade. Among the follicular carcinoma highest (40%) were

found in the 5<sup>th</sup> decade. The lowest age was 13 and the highest at 65 years of age. [Table 1]



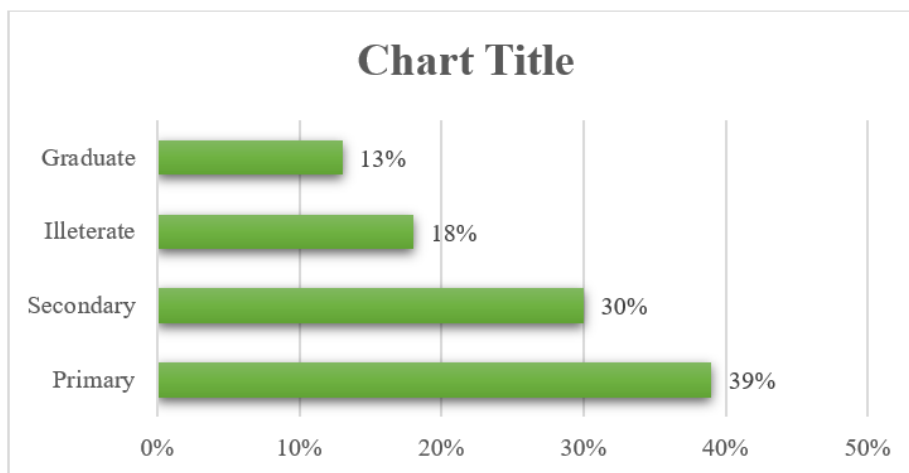
**Figure 1: Sex distribution of the respondents according to type of thyroid carcinoma (N=40)**

Male to female ratio was 1:2.5 in papillary and 1:5 in follicular carcinoma. [Figure 1]



**Figure 2: Distribution of patients according to residents (N=40)**

In this series, 22 (55%) subjects resided in rural areas. [Figure 2]



**Figure 3: Educational status of the study subjects (N=40)**

In the present study, a majority (39.0%) of the patients had primary level education, followed by (30.0%) secondary level. [Figure 3]

**Table 2: Distribution of the type of malignancy in DTC (N=40)**

Type of malignancy	n	%
Papillary	35	87.5%
Follicular	5	12.5%
Total	40	100%

In this study, a majority (35, 87.5%) of the patients suffered from papillary carcinoma, followed by (5,12.5%) follicular carcinoma. [Table 2]

**Table 3: Symptoms on admission to hospital of differentiated thyroid carcinoma(N=40)**

Symptoms	n	%
Swelling in the neck	39	97.5%
Dyspnea	1	2.5%
Symptoms of distant metastasis	3	7.5%

The commonest symptom for seeking medical admission was swelling in the neck (Lymph node swelling included), which was present in 39(97.5%)

cases. Symptoms of distant metastasis and dyspnoea were present in 3(7.5%) and 1(2.5%) case respectively. [Table 3]

**Table 4: Distribution of distant metastasis in DTC (N=40)**

Types of malignancy	n	Patients with metastasis (n)		Metastasis (%)
		Lung	Bone	
Papillary	35	2	0	5.71%
Follicular	5	1	1	40%

Considering the distant metastasis, 2 (5.71%) patients had metastasis to the lung among the patients with papillary carcinoma (n=35). 1 patient had lung

metastasis and another 1 patient had bony metastasis among the follicular carcinoma patients. [Table 4]

**Table 5: Site of distribution of distant metastasis in DTC (n= 4)**

Types of malignancy	Site of distant metastasis		%
	Lung	Bone	
Papillary	2	0	50%
Follicular	1	1	50%
Total	3	1	100%

In this study, 50% of the patients had distant metastasis from each papillary and follicular carcinoma. [Table 5]

## DISCUSSION

Carcinoma of the thyroid gland is an uncommon cancer, in 0.6% and 1.6% of all cases of malignant neoplasms in men and women respectively. but is the most common malignancy in the endocrine system. Among them, differentiated thyroid carcinoma (papillary and follicular) is highly treatable and has a good prognosis. The incidence of this malignancy has increased over the last decade. In a series of DTC cases in BSMMU Dhaka, it has been shown that the incidence of DTC is increasing, like 3 cases in 1986 and 23 cases in 2000. The cause may be due to modern diagnostic techniques and increased cancer consciousness among the people. Yet this has been associated with a significant fall in mortality rate in some countries [18]. The age of patients in differentiated thyroid carcinoma in this series ranges from 13 to 65. Years. Irrespective of sex maximum number of patients (62.86%) were found in the age group of 21 – 30 years in papillary carcinoma and

41- 50 Years (40%) in follicular carcinoma. Therefore, the peak incidence of the disease is in the 3<sup>rd</sup> decade in papillary and the 5<sup>th</sup> decade in follicular carcinoma. One study done in Bangladesh reported that the highest number of patients present in the 4<sup>th</sup> decade both in papillary and follicular carcinoma [18]. Whereas, in another study, it is the 5<sup>th</sup> decade for papillary and the 6<sup>th</sup> decade for follicular carcinoma [3]. Among forty patients thirty were female and ten were male. Females are more commonly affected than males and the male-female overall ratio is 1:3, for papillary it is 1:2.5, and for follicular it is 1:5. In other series male-female ratio is 1:2.5 [19] and 1:1.6 [18]. The commonest symptom for seeking medical admission of differentiated thyroid carcinoma was swelling in the neck (Lymph node swelling included). Regarding the histological type of differentiated thyroid carcinoma, 35 patients (87.5%) had papillary and 5 (12.5%) had follicular carcinoma in this series. Papillary type was more common than follicular type in differentiated thyroid carcinoma. Relative incidence in other studies are 73.33% [20], 80% [1], 60% [21], 75.3% [18] for papillary and 26.67% [20], 10% [1], 20% [21], 24.62% [18]. FNAC findings showed

that its accuracy is 94.23% in papillary carcinoma (33 reported positive, 1 benign, and 1 suspicious), but FNAC cannot differentiate follicular adenoma and carcinoma. Which correlates with other literature [21]. In this study four (10%) patients were found with distant metastasis, of them two patients (5.71%) had papillary and two patients (40%) had follicular carcinoma, which correlates with a previous study that shows 2.27% for PTC and 25% for FTC [20]. In my study, two patients with papillary carcinoma and one with follicular carcinoma had lung metastasis. One patient (20%) with follicular carcinoma had skull bone metastasis. This feature represents distant metastasis more common in follicular carcinoma (40%). Common sites of distant metastasis are the lungs and bones. The frequency of distant metastasis in other reported series was reported from 15% [18] to 22% [22]. In the risk group definition, men of 40 years and younger, women of 50 years and younger without distant metastasis, all patients with intra-thyroid papillary carcinoma or follicular carcinoma with minor capsular invasion with tumor size <5cm in diameter, no distant metastasis are in a low-risk group. All patients with distant metastasis; and all older patients with extra thyroid papillary or follicular carcinoma with major capsular invasion with a tumor size 5 cm in diameter or more are in the high-risk group [21].

### Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

### CONCLUSION

This study concludes that metastasis in differentiated thyroid carcinoma is not uncommon. Distant metastasis is more common in follicular thyroid carcinoma. Lung and bone metastasis are common regarding the site of metastasis.

### RECOMMENDATION

This study provides important insight that may guide the management plan of distant metastasis in differentiated thyroid carcinoma. Moreover, further studies should be conducted involving a large sample size and multiple centers in this regard.

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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